

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

Claims 1-14. (Cancelled)

15. (New) A solar radiation shielding apparatus including an obstacle detection stopping device for stopping an extension of a solar radiation shielding member after an obstacle contacts said solar radiation shielding member, the apparatus comprising:

a rotatable winding pulley;

a supporting member rotatably supporting said winding pulley;

a lifting cord supported by said winding pulley;

said solar radiation shielding member supported by said lifting cord;

a rotatable driving shaft selectively rotatably driving said winding pulley in a rolling-up direction of the lifting cord to retract said solar radiation shielding member, said winding pulley being rotatable in an unwinding direction of the lifting cord by a tension exerted on said lifting cord to extend said solar radiation shielding member; and

said obstacle detection stopping device which includes:

an obstacle detector frictionally engaging said winding pulley and adapted to stop rotation of said driving pulley after the tension exerted on said lifting cord is interrupted; and

a stop operably engageable with said driving shaft and adapted to stop

rotation of said driving shaft relative to said winding pulley which is stopped by said obstacle detector;

said stop comprising:

a clutch which is selectively movable in a direction of the axis line of said winding pulley;

a rotary drum which is fixed against movement in the direction of the axis line of said winding pulley and is rotatable with the driving shaft; and

a braking projected part formed on said supporting member so as to be engageable with said clutch,

wherein said clutch is inserted into a penetrating hole formed in said supporting member so that a cylinder portion formed at an edge of said clutch is relatively rotatable and movable in the direction of the axis line, and obstructs the rotation of said driving shaft by letting the rotation of the rotary drum stop in response to becoming impossible to rotate, by moving in the direction of the axis line of said winding pulley according to rotation of said driving shaft relative to said winding pulley and engaging with said braking projected part of said supporting member.

16. (New) A solar radiation shielding apparatus including an obstacle detection stopping device for stopping an extension of a solar radiation shielding member after an obstacle contacts said solar radiation shielding member, the apparatus comprising:

a rotatable winding pulley;

a supporting member rotatably supporting said winding pulley;

a lifting cord supported by said winding pulley;
said solar radiation shielding member supported by said lifting cord;
a rotatable driving shaft selectively rotatably driving said winding pulley in a rolling-up direction of the lifting cord to retract said solar radiation shielding member, said winding pulley being rotatable in an unwinding direction of the lifting cord by a tension exerted on said lifting cord to extend said solar radiation shielding member; and

said obstacle detection stopping device which includes:

an obstacle detector frictionally engaging said winding pulley and adapted to stop rotation of said winding pulley after the tension exerted on said lifting cord is interrupted; and

a stop operably engageable with said driving shaft and adapted to stop rotation of said driving shaft relative to said winding pulley which is stopped by said obstacle detector;

said stop comprising:

a clutch that has a braking claw which is selectively movable in a direction of the axis line of said winding pulley;

a rotary drum which is fixed against movement in the direction of the axis line of said winding pulley and is rotatable with the driving shaft; and

a braking projected part formed on said supporting member so as to be engageable with said braking claw of said clutch,

wherein said clutch is inserted into a penetrating hole formed in said supporting member so that a cylinder portion formed at an edge of said clutch is relatively rotatable and movable in the direction of the axis line, and obstructs the

rotation of said driving shaft by letting the rotation of the rotary drum stop in response to becoming impossible to rotate, by moving in the direction of the axis line of said winding pulley according to rotation of said driving shaft relative to said winding pulley and said braking claw engaging with said braking projected part of said supporting member.

17. (New) The apparatus according to claim 15, wherein said stop includes a cam mechanism that moves said clutch in the direction of the axis line of said winding pulley according to rotation of said driving shaft relative to said winding pulley.

18. (New) The apparatus according to claim 16, wherein said stop includes a cam mechanism that moves said braking claw in the direction of the axis line of said winding pulley to engage with said supporting member according to rotation of said driving shaft relative to said winding pulley.

19. (New) The apparatus according to one of claims 15 to 18, wherein said obstacle detector further comprises a friction generator disposed between said winding pulley and a supporting member rotatably supporting said winding pulley.

20. (New) A solar radiation shielding apparatus including an obstacle detection stopping device for stopping an extension of a solar radiation shielding member after an obstacle contacts said solar radiation shielding member, the apparatus comprising:

a rotatable winding pulley;

a lifting cord supported by said winding pulley;
said solar radiation shielding member supported by said lifting cord;
a rotatable driving shaft selectively rotatably driving said winding pulley in a rolling-up direction of the lifting cord to retract said solar radiation shielding member, said winding pulley being rotatable in an unwinding direction of the lifting cord by a tension exerted on said lifting cord to extend said solar radiation shielding member; and

said obstacle detection stopping device which includes:

an obstacle detector frictionally engaging said winding pulley and adapted to stop rotation of said driving pulley after the tension exerted on said lifting cord is interrupted; and

a stop operably engageable with said driving shaft and adapted to stop rotation of said driving shaft relative to said winding pulley which is stopped by said obstacle detector;

said stop comprising:

a clutch mounted along said driving shaft so as to be axially movable but nonrotatable relative to said winding pulley, said clutch having a sliding hole that is inclined with respect to said winding pulley;

a rotary drum mounted along said driving shaft so as to be rotatable within a predetermined range, to be axially movable relative to said clutch, and to be rotatable with the driving shaft, said rotary drum including a sliding projected part that is slideable inside said sliding hole but nonmovable relative to said winding pulley; and

a braking projected part mounted along said driving shaft and engageable with said clutch to stop rotation of said clutch,

wherein said clutch moves axially along said driving shaft in response to rotation relative to said rotary drum and stops the rotation by engaging said braking projected part; and

said rotary drum includes a controlling projected part to stop rotation of said clutch that selectively engages an engaging projected part of said winding pulley to stop rotation of said driving shaft.

21. (New) The apparatus according to claim 20, wherein said clutch includes a plurality of braking claws evenly disposed along a circumferential direction of said clutch, the plurality of braking claws being selectively engageable with said braking projected part.

22. (New) The apparatus according to one of claims 15, 16, 17, 18, 20 and 21, wherein said stop is provided at only two locations along said driving shaft.